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CIVIL SERVICE COMMISSION.

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OPEN COMPETITIONS

FOR SITUATIONS AS

JUNIOR ASSISTANT

IN THE ART AND SCIENCE BRANCHES OF THE

SOUTH KENSINGTON MUSEUM.

July, 1895.

REGULATIONS, EXAMINATION PAPERS, AND TABLES OF MARKS.



LONDON:

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1895.

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Regulations, &c.

I.—SPECIAL REGULATIONS (Supplementary to the GENERAL REGULATIONS issued 8th April, 1872, and amended by subsequent Notices in the LONDON GAZETTE*) respecting OPEN COMPETITIVE EXAMINATIONS for the SITUATION of JUNIOR ASSISTANT in the SOUTH KENSINGTON MUSEUM (ART BRANCH).

N.B.—These Regulations are liable to alteration for future Examinations.

I. The limits of age for this situation are 18 and 25, and Candidates must be of the prescribed age on the first day of the Examination.

II. The Examination will be in the following subjects, viz. :—

(A.)—OBLIGATORY.

	Marks.
1. English Composition	500
2. Drawing of Objects of Decorative Art	500
3. Any two of the following languages :—	
(a) Latin	500
(b) Greek	500
(c) French	400
(d) German	400
(e) Italian	400
4. English History from the Conquest	400

(B.)—OPTIONAL.

5. One of Group 3 not taken as an obligatory subject.
6. Knowledge of Art Objects tested by a *viva voce* Examination, and also by an Examination paper: and, History of some one period of Art (at the option of the Candidate) 1000

III. Application for permission to attend an Examination must be made at such times and in such manner as the Commissioners may appoint.

IV. A fee of £3 will be required from each Candidate attending the Examination.

Civil Service Commission,
16th April, 1895.

NOTICE.

An Open Competitive Examination for the situation of Junior Assistant in the South Kensington Museum (Art Branch), will be held in London, under the foregoing Regulations, commencing on the 9th July, 1895.

* These Regulations are printed on page 4.

The number of situations to be filled will be the number vacant at the time of the Examination.*

** No person will be admitted to the Examination from whom the Secretary, Civil Service Commission, has not received, on or before the 27th June, an application, in the handwriting of the Candidate, on the prescribed form, of which a copy is herewith enclosed.

The Order for admission to the Examination will be posted on the 4th July, to the address given on the Form of Application. It will contain instructions as to the time and place at which candidates will be required to attend, and as to the manner in which the fee is to be paid.

Civil Service Commission,
14th May, 1895.

NOTE.—Junior Assistants in the South Kensington Museum (Art Branch) receive salary commencing at £95 a year, and rising by annual increments to £250 per annum; with a prospect of promotion to the situation of Assistant Keeper with a salary rising to £400 per annum.

The successful Candidate will accept his appointment subject to the express condition that the Staff of the Department is liable to re-organisation from time to time, as the interests of the public service may require, and that no claim to compensation on his behalf can be admitted if such re-organisation shall in effect reduce the number, or alter the conditions of superior appointments in the Department. Promotion to higher grades depends on merit, and on the occurrence of vacancies, but no right of promotion to higher classes or grades is recognised.

GENERAL REGULATIONS, issued 8th April, 1872, and amended by Notices in the LONDON GAZETTE of the 24th January, 1873, 21st November, 1873, 16th June, 1874, 5th February, 1875, 9th November, 1875, 20th September, 1878, 12th September, 1879, 27th July, 1880, 23rd November, 1880, 1st August, 1882, 19th May, 1885, and 22nd January, 1886) respecting OPEN COMPETITIVE EXAMINATIONS for SITUATIONS in the CIVIL SERVICE, included in Schedule A. of the Order in Council of 4th June, 1870.

N.B.—These Regulations are liable to alteration at any time.

1. Competitive examinations of Candidates for situations in the different public departments will be held at such times and at such places as may be deemed expedient. Before every such examination Special Regulations will be issued, in which the particular conditions of the competition will be specified.

2. These examinations will have reference either to the vacancies existing at the time of the examinations respectively, or to the number which may be estimated to occur within any period not exceeding six months after the commencement of the examinations, as may be laid down in Special Regulations, or in any Notice of such examinations published, with the approval of the Lords of the Treasury, in the "London Gazette."

3. These examinations are open, under such general restrictions as may be laid down, to all natural-born subjects of Her Majesty, being of the requisite age, health, and character. The undermentioned restrictions are at present in force :

(i.) Persons actually serving in the Army and Navy, and members of the Royal Irish Constabulary of less than five years' service are ineligible.

* The number now vacant is one.

(ii.) The following classes of persons are eligible under certain conditions only, that is to say :--

- (a.) Persons holding situations in the Civil Service.
- (b.) Members of the Royal Irish Constabulary, of more than 5 years' service.
- (c.) Apprentices and Engineer students in Her Majesty's Dockyards.
- (d.) Persons who have been trained in Normal Schools at the public expense.
- (e.) Persons who have been trained in the Laboratory of the Inland Revenue Department.

Persons comprised in the classes (a), (b), (c) must produce to the Civil Service Commissioners the written permission* of the authorities of their department to attend the examination, dated before the commencement of the competition.

Persons comprised in class (d) will not be qualified to receive appointments until the consent of the Committee of Council on Education, Great Britain, or the Commissioners of National Education, Ireland, as the case may be, given in conformity with rules sanctioned by the Lords of the Treasury, has been notified to the Civil Service Commissioners.

Persons comprised in class (e) will not be qualified for appointment until the consent of the Board of Inland Revenue, given with the like sanction, has been notified to the Civil Service Commissioners.

4. In reckoning age for competition the following allowances will be made, viz., (1) members of the Military and Naval services (whether commissioned or non-commissioned) may deduct from their actual age any time during which they have served towards pension ; (2) persons who have served for two full consecutive years (a) in any Civil situation to which they were admitted with the Certificate of the Civil Service Commissioners, (b) in the Royal Irish Constabulary, or (c) as Registered Copyists in connexion with the Civil Service, may deduct from their actual age any time not exceeding five years which they may have spent in such service.

5. If at any examination two or more situations, whether in the same or in different Departments, shall be offered for competition, the successful Candidates will be permitted (unless otherwise stated in Special Regulations) to choose in their order as determined by the competitive examination among the situations offered for competition ; provided that they be duly qualified according to the special rules prescribed under Clause IV. of Her Majesty's Order in Council of 4th June, 1870, for the particular situations to which they may severally be assigned. If there be a vacant situation for which no one of the successful Candidates is duly qualified, the Civil Service Commissioners may offer it to the highest Candidate on the list whom they may deem duly qualified, or to the Candidate highest at the time on the list, subject to his passing a qualifying examination within such period as they may determine ; or they may reserve it to be filled by means of a subsequent open competition, or otherwise, as they may see fit, in accordance with the Order in Council of 4th June, 1870.

Civil Service Commission, London, S.W.

* It is desirable that this permission should be produced at least one week before the date of the competition.

II.—SPECIAL REGULATIONS (Supplementary to the GENERAL REGULATIONS issued 8th April, 1872, and amended by subsequent Notices in the LONDON GAZETTE*), respecting OPEN COMPETITIVE EXAMINATIONS for the SITUATION of JUNIOR ASSISTANT in the SOUTH KENSINGTON MUSEUM (SCIENCE BRANCH).

N.B.—These Regulations are liable to alteration for future Examinations.

I. The limits of age for this situation are 18 and 25, and Candidates must be of the prescribed age on the first day of the examination.

II. The Examination will be in the following subjects, viz. :—

(A).—OBLIGATORY.

Marks.

- | | |
|---|-----|
| 1. Geometrical Drawing | 500 |
| 2. English Composition | 500 |
| 3. Mathematics, viz. :—Arithmetic, Algebra, up to and including the Binomial Theorem, Euclid Books I. to IV. .. | 750 |

4. And one of the following :—

- | | |
|---|-----|
| (a) Biology | 500 |
| (b) Chemistry | 500 |
| (c) Physics | 500 |
| (d) Geology | 500 |
| (e) Higher Mathematics | 500 |
| (f) Applied Mechanics and Machine Drawing | 500 |

(B).—OPTIONAL.

5. Any two of the last group not taken as an Obligatory Subject 500 (each)

6. Any two of the following languages :—

- | | |
|--------------------|---|
| (a) Latin | } translation from, and into : 250 (each) |
| (b) Greek | |
| (c) French | |
| (d) German | |

III. Application for permission to attend an examination must be made at such times and in such manner as the Commissioners may appoint.

IV. A fee of £3 will be required from each Candidate attending the Examination.

Civil Service Commission,
16th April, 1895.

NOTICE.

An Open Competitive Examination for the situation of Junior Assistant in the South Kensington Museum (Science Branch), will be held in London under the foregoing Regulations, commencing on the 9th July, 1895.

The number of situations to be filled will be the number vacant at the time of the Examination.†

*** No person will be admitted to the Examination from whom the Secretary, Civil Service Commission, has not received, on or before the 27th June, an application, in the handwriting of the Candidate, on the prescribed form.

The Order for admission to the Examination will be posted on the 4th July, to the address given on the Form of Application. It will contain instructions as to the time and place at which Candidates will be required to attend, and as to the manner in which the fee is to be paid.

Civil Service Commission,
14th May, 1895.

NOTE.—Junior Assistants in the South Kensington Museum (Science Branch) receive salary commencing at £95 a year, and rising by annual increments to £250

* These Regulations are printed on page 4.

† The number now vacant is one.

per annum; with a prospect of promotion to the situation of Assistant Keeper with a salary rising to £400 per annum.

The successful candidate will accept his appointment subject to the express condition that the staff of the Department is liable to re-organization from time to time, as the interests of the public service may require, and that no claim to compensation on his behalf can be admitted if such re-organization shall in effect reduce the number, or alter the conditions of superior appointments in the Department. Promotion to higher grades depends on merit, and on the occurrence of vacancies, but no right of promotion to higher classes or grades is recognised.

SYLLABUS showing the extent of the EXAMINATION in HIGHER MATHEMATICS for the SITUATION of JUNIOR ASSISTANT in the South KENSINGTON MUSEUM (SCIENCE BRANCH).

Euclid Book VI.; Plane Trigonometry, up to and including the solution of triangles; Geometrical Conic Sections; Analytical Geometry (elementary); Statics, the equilibrium of forces acting in one plane and of parallel forces, the centre of gravity, the mechanical powers and friction; Dynamics; uniform, uniformly accelerated and uniform circular motion, falling bodies and projectiles in vacuo, collisions, and work.

Civil Service Commission,
2nd May, 1895.

Time Table.

JUNIOR ASSISTANT IN THE SOUTH KENSINGTON MUSEUM (ART BRANCH.)

Time of Examination.		Subjects of Examination.	
Tuesday, 9th July	10 A.M. to 1 P.M.	..	English Composition.
	2 P.M. to 5 P.M.	..	French.
Wednesday, 10th "	10 A.M. to 1 P.M.	..	Latin.
	2 P.M. to 5 P.M.	..	History.
Thursday, 11th "	10 A.M. to 1 P.M.	..	Drawing.
	2 P.M. to 5 P.M.	..	Greek, Italian.
Friday, 12th "	10 A.M. to 1 P.M.	..	*Knowledge of Art Objects.
	2 P.M. to 5 P.M.	..	*History of Art.

* In these subjects there will be an Oral Examination, the time and place of which will be notified to the Candidates who take them up.

No drawing materials beyond Drawing Paper, Drawing Boards, T-Squares, Palettes, Indian Ink, and Colours will be supplied by the Commissioners. Candidates must bring with them any other instruments or materials which they may wish to use.

If from any cause it should be found impossible to adhere to the precise times set down in this table, care will be taken that the Candidates are allowed the full time for each paper.

N.B.—Candidates failing to attend punctually will forfeit their right to be examined.

Time Table.

JUNIOR ASSISTANT IN THE SOUTH KENSINGTON MUSEUM (SCIENCE BRANCH.)

Time of Examination.			Subjects of Examination.
Tuesday, 9th July	{	10 A.M. to 1 P.M. 2 P.M. to 5 P.M.	.. English Composition. .. French.
Wednesday, 10th "	{	10 A.M. to 1 P.M. 2 P.M. to 5 P.M.	.. Latin, German. .. Elementary Mathematics (1).
Thursday, 11th "	{	10 A.M. to 1 P.M. 2 P.M. to 5 P.M.	.. Geometrical Drawing. .. Elementary Mathematics (2).
Friday, 12th "	{	10 A.M. to 1 P.M. 2 P.M. to 5 P.M.	.. Chemistry. .. Physics.
Saturday, 13th "	{	10 A.M. to 1 P.M. 2 P.M. to 5 P.M.	.. Geology, Higher Mathematics (1.) .. Applied Mechanics, Higher Mathematics (2.)
Monday, 15th "	{	10 A.M. to 1 P.M. 2 P.M. to 6 P.M.	.. Machine Drawing. .. Practical Chemistry.
Tuesday, 16th "	{	10 A.M. .. 2 P.M. ..	.. Practical Geology. .. Practical Physics.

No drawing materials beyond Drawing Paper, Drawing Boards, T-Squares, Palettes, Indian Ink, and Colours will be supplied by the Commissioners. Candidates must bring with them any other instruments or materials which they may wish to use.

If from any cause it should be found impossible to adhere to the precise times set down in this Table, care will be taken that the Candidates are allowed the full time for each paper.

N B.—Candidates failing to attend punctually will forfeit their right to be examined.

Notices.

1. Candidates must, before proceeding to the Examination Rooms, leave, in a room provided for the purpose, their hats, overcoats, umbrellas, and any books or papers which they may have brought with them.
 2. No Candidate may quit the Examination Room until the expiration of half an hour from the time fixed for the commencement of the paper on which he is engaged.
 3. No Candidate who has left the Examination Room during the hours assigned to paper work may return to the paper which he has quitted, without special permission, obtained before he leaves the room. In such cases, the Commissioners will decide whether marks can be allotted.
 4. Perfect silence must be preserved in the Examination Room; and any Candidate guilty of disorderly or improper conduct in or about the Room will be liable to exclusion from the Examination.
 5. Any Candidate detected in the Examination Room in the possession of a book, manuscript, or other article from which he might derive irregular assistance, or in copying from the papers of any other Candidate, or in permitting his own papers to be copied, or in giving or attempting to give, or in obtaining or attempting to obtain assistance of any description, will be thereby disqualified, and will not be admitted to any subsequent Examination held under the directions of the Civil Service Commissioners.
 6. Each Candidate will be designated by the number assigned to him on the Order for Examination, and he must write this Number (not his Name) on every book or separate sheet of paper which he sends in.
 7. Any Candidate who is dissatisfied with the pens, ink, or paper supplied to him is requested to apply to the Superintendent of the Examination Room; but those who prefer any particular kind of pen are recommended to bring it with them.
-

Examination Papers.

SUBJECTS FOR ENGLISH COMPOSITION.

[Set to Candidates for either situation.]

You should pay attention to your spelling, punctuation, grammar, and style. Your Composition should fill at least two pages of your book, but it will be valued according to the quality rather than the quantity.

Write an essay on *one* of the following subjects :—

1. A National Portrait Gallery.

Or,

2. What arts coöperate with architecture, and at what periods have they been severally most developed?

Or,

3. What are the best means to encourage individuality and good taste in handicrafts in an age of machinery?

FRENCH.

[Set to Candidates for either situation.]

Translate into English :—

I.

Voici la Ville Nouvelle qui, en dix ans, a surgi sur les ruines de celle qu'ont bouleversée l'incendie, les tremblements de terre et les massacres.

Elle a envahi l'immense prairie, elle conquiert la plaine. En tout sens, on bâtit ; des maisons reluisantes, puis des espaces vides, de l'herbe, et des maisons encore, et des monuments épars, dressés comme des pavillons blancs sur quelque pelouse anglaise.

Non loin des restes de l'église Sainte-Sophie, qui eut pour marraine une princesse byzantine, et dont la forme en croix apparaît encore sous les ronces dévoratrices des pierres assombries, l'Imprimerie nationale, pour laquelle des millions ont servi, et qui représente là l'usine du progrès ; la Banque bulgare allonge sa façade ouvree ; le ministère des affaires étrangères détache avec éclat l'importance de sa modernité : c'est un privilégié, à côté duquel se fait valoir la modestie agreste des bureaux de l'Intérieur—un petit rez-de-chaussée de bois verni, fleurant encore la forêt, embrouillé de fils télégraphiques, avec des couloirs de planches nues où traîne l'odeur de lampes d'essence.

Mais ces palais ne dominant point la ville ; la cathédrale elle-même, verte et blanche, sans cloches,—elles sont accrochées en carillon sous une gloriette voisine et à portée du passant, n'est point dominatrice : et ainsi l'on dirait une ville couchée très bas, encore près de la terre, et avec ses toits d'un rouge vif, dans la première toilette de l'enfance.

II.

S'il est vrai qu'un grand donne plus à la fortune lorsqu'il hasarde une vie destinée à couler dans les ris, le plaisir et l'abondance, qu'un particulier qui ne risque que des jours qui sont misérables, il faut avouer aussi qu'il a un tout autre dédommagement, qui est la gloire et la haute réputation : le soldat ne sent pas qu'il soit connu, il meurt obscur et dans la foule ; il vivait de même à la vérité, mais il vivait ; et c'est l'une des sources du défaut de courage dans les conditions basses et serviles. Ceux au contraire que la naissance démêle d'avec le peuple, et expose aux yeux des hommes, à leur censure, et à leurs éloges, sont même capables de sortir par effort de leur tempérament, s'il ne les portait pas à la vertu : et cette disposition de cœur et d'esprit, qui passe des aïeux par les pères dans leurs descendants, est cette bravoure si

familière aux personnes nobles, et peut-être la noblesse même.

Jetez-moi dans les troupes comme un simple soldat, je suis THERSITE ; mettez-moi à la tête d'une armée dont j'aie à répondre à toute l'Europe, je suis ACHILLE.

Translate into French :—

III.

Two days after the birth of his fifth child, Charles Dickens received an invitation from three of his intimate friends to dine at Richmond. This is the amusing reply :—

Fellow Countrymen : The appeal with which you have honoured me, awakens within me emotions that are more easily imagined than described. Heaven bless you. I shall indeed be proud, my friends, to respond to such a requisition. I had withdrawn from Public Life—I fondly thought for ever—to pass the evening of my days in hydropathical pursuits, and the contemplation of virtue. For which latter purpose I had bought a looking glass. But, my friends, private feeling must ever yield to a stern sense of public duty. The Man is lost in the Invited Guest, and I comply. Nurses ; apothecaries ; mothers-in-law ; babies ; with all the sweet delights of private life ; these, my countrymen, are hard to leave. But you have called me forth, and I will come. Fellow Countrymen,

Your friend and faithful servant,

CHARLES DICKENS.

LATIN.

[Set to Candidates for either situation.]

Translate into English :—

I.

Supergressi tumulos, qui Cynoscephalae vocantur, relicta ibi statione firma peditum equitumque, posuerunt

castra. Romanus eisdem ad Thetideum castris quum se tenuisset, exploratum tamen, ubi hostis esset, decem turmas equitum et mille pedites misit, monitos, ut ab insidiis, quas dies obscurus apertis quoque locis tecturus esset, praecaverent. Ubi ventum ad inessos tumulos est, pavore mutuo iniecto velut torpentes quieverunt; dein nuntiis retro in castra ad duces missis, ubi primus terror ab necopinato visu consedit, non diutius certamine abstinuere. Principio a paucis procurrentibus lacessita pugna est, deinde subsidiis tuentium pulsos aucta. In qua quum haudquaquam pares Romani alios super alios nuntios ad ducem mitterent, premi sese, quingenti equites et duo millia peditum, maxime Aetolorum, cum duobus tribunis militum propere missa rem inclinatam restituerunt, versaque fortuna, Macedones laborantes opem regis per nuntios implorabant.

II.

Tum Meropem atque Erymanta manu, tum sternit
Aphidnum;

Tum Bitian ardentem oculis animisque frementem,
Non iaculo; neque enim iaculo vitam ille dedisset;
Sed magnum stridens contorta phalarica venit,
Fulminis acta modo; quam nec duo taurea terga,
Nec duplici squama lorica fidelis et auro
Sustinuit; conlapsa ruunt inmania membra.
Dat tellus gemitum, et clipeum super intonat ingens.
Talis in Euboico Baiarum litore quondam
Saxea pila cadit, magnis quam molibus ante
Constructam ponto iaciunt: sic illa ruinam
Prona trahit, penitusque vadis inlisa recumbit;
Miscent se maria, et nigrae attolluntur arenae;
Tum sonitu Prochyta alta tremit, durumque cubile
Inarime Iovis inperiis inposta Typhoeo.

III.

Translate into Latin:—

At this moment the stillness of the mist was broken by barbarian war-cries on every side; and both flanks of the Roman column were assailed at once. Their right

was overwhelmed by a storm of javelins and arrows, shot as if from the midst of darkness, and striking into the soldier's unguarded side, where he had no shield to cover him; while ponderous stones, against which no shield or helmet could avail, came crashing down upon their heads. On the left were heard the trampling of horse, and the well-known war-cries of the Gauls; and presently Hannibal's dreaded cavalry emerged from the mist and were in an instant in the midst of their ranks; and the huge forms of the Gauls and their vast broadswords broke in upon them at the same moment.

ENGLISH HISTORY FROM THE CONQUEST.

[Set only to the Art Branch Candidates.]

[Any twelve of the questions to be answered.]

1. State the main features of the Feudal System, giving the origin of the name, and the meaning of the phrases "In Fee" and "Feudal Incidents."
2. What were the two special causes which led to the quarrel between the Crown and the Church in the reign of William Rufus, and to what burning question did this quarrel give rise? What compromise was effected in the reign of the First Henry?
3. Mention some of the politic steps which, on ascending the throne, Henry I. took to please his subjects, and what great benefit accrued to the nation from one of them in particular.
4. State briefly the social, commercial, and political effects of the Crusades.
5. What were the two great aims of Edward I.? State briefly his dealings with Scotland and Wales.

6. Give a sketch of the Second French War under Henry V., and state the terms of the peace by which it was closed.
7. What was the origin of the Tudor dynasty, and what were the means by which the hostility of the rival Roses was allayed? Give the names of the Tudor sovereigns, with dates of accession.
8. What is it that gives the deepest interest and the greatest importance to the reign of Henry VII.? Say what was the aim of his foreign policy; and mention the evils to which his special "weakness" led.
9. Sketch, as briefly and as clearly as possible, the main features of the reign of Henry VIII.
10. Give a succinct account of the Spanish Armada—its causes, its course, and its fate.
11. Name the principal writers of the Tudor period, and at least one work of each author.
12. Give an account of the Union of the crowns of England and Scotland, and state fully how the right of succession belonged to James VI. of Scotland.
13. What was the Hampton Court Conference? What was its object and what was its great outcome? Give details.
14. Give the principal points in dispute between Charles I. and the Parliament, and note the course of the struggle. What is meant by the "Divine Right of Kings"?
15. Explain the following:—scutage; assize of arms; benevolences; purveyance; monopolies; tunnage (or tonnage) and poundage; Habeas Corpus; Bill of Attainder; ship money; flotsam and jetsam.
16. Describe the course of the war in Ireland between James II. and William of Orange. Why was the latter called "of Orange"?
17. Give a history of the movement for the Repeal of the Corn Laws, and state the effects that followed on the Repeal.

18. Write brief biographies of any three of the following :—Wycliffe, Columbus, Wolsey, Luther, Sir Walter Raleigh, Sir Isaac Newton, Sir Robert Peel, Viscount Melbourne, Sir Thos. More, Robert Harley (Earl of Oxford).
-

DRAWING OF OBJECTS OF DECORATIVE ART.

[Set only to the Art Branch Candidates.]

[N.B.—*The drawing must be entirely free-hand ; no instrument or mechanical aid of any kind is allowed.*

In making drawings from models, or any kind of solids, you will necessarily have to deal with cross-lights ; all such objects must be drawn just as they happen to be lighted.

The paper supplied must not be torn, nor must any other be used, and the drawing must be executed on one side only of the paper. No drawing whatever is allowed on the printed examination paper, or on the blotting paper. If you cancel a drawing and require fresh paper, you can have more, but every sheet issued to you must be returned by you with your name written upon it.]

Place your Number on the right-hand upper corner of each sheet. By neglecting to do this you will risk the loss of the marks which you might otherwise obtain.

Make as finished a drawing as you can, in light and shade, of the cast (fruit and leaves) before you, using pencil, pen, or sepia, as you think best.

GREEK.

[Set only to the Art Branch Candidates.]

Translate into English:—

I.

Δοκέετε δέ μοι πολὺ βέλτιον ἂν περὶ τοῦ πολέμου καὶ ὅλης τῆς παρασκευῆς βουλευσασθαι, εἰ τὸν τόπον, ὃ ἄνδρες Ἀθηναῖοι, τῆς χώρας, πρὸς ἣν πολεμεῖτε, ἐνθυμηθείητε, καὶ λογίσαισθε, ὅτι τοῖς πνεύμασι καὶ ταῖς ὥραις τοῦ ἔτους τὰ πολλὰ προλαμβάνων διαπράττεται Φίλιππος, καὶ φυλάξας τοὺς ἐτησίας ἢ τὸν χειμῶνα ἐπιχειρεῖ, ἥνίκ' ἂν ἡμεῖς μὴ δυναίμεθα ἐκείσε ἀφικέσθαι. δεῖ τοίνυν ταῦτ' ἐνθυμουμένους, μὴ βοηθείαις πολεμεῖν, ὑστεριούμεν γὰρ ἀπάντων, ἀλλὰ παρασκευῇ συνεχεῖ καὶ δυνάμει. ὑπάρχει δ' ὑμῖν χειμαδίῳ μὲν χρῆσθαι τῇ δυνάμει Δήμῳ καὶ Θάσῳ καὶ Σκιάθῳ καὶ ταῖς ἐν τούτῳ τῷ τόπῳ νήσοις, ἐν αἷς καὶ λιμένες καὶ σῖτος καὶ ἅ χρῆ στρατεύματι πάνθ' ὑπάρχει· τὴν δ' ὥραν τοῦ ἔτους, ὅτε καὶ πρὸς τῇ γῇ γενέσθαι ῥάδιον καὶ τὸ τῶν πνευμάτων ἀσφαλές, πρὸς αὐτῇ τῇ χώρᾳ καὶ πρὸς τοῖς τῶν ἐμπορίων στόμασι ῥαδίως ἔσται.

II.

Ἐμοὶ γὰρ εἴη μήτε λανθάνειν καλὰ μήτ' αἰσχροὶ δρώσῃ μάρτυρας πολλοὺς ἔχειν. τὸ δ' ἔργον ἤδη τὴν νόσον τε δυσκλεᾶ, γυνή τε πρὸς τοῖσδ' οὖς' ἐγίγνωσκον καλῶς, μίσσημα πᾶσιν. ὥς ὅλοιτο παγκάκως ἥτις πρὸς ἄνδρας ἥρξατ' αἰσχύνειν λέχη πρώτῃ θυραίους. ἐκ δὲ γενναίων δόμων τόδ' ἥρξε θηλείαισι γίγνεσθαι κακόν. ὅταν γὰρ αἰσχροὶ τοῖσιν ἐσθλοῖσιν δοκῇ, ἢ κάρτα δόξει τοῖς κακοῖς εἶναι καλά. μισῶ δὲ καὶ τὰς σόφρονας μὲν ἐν λόγοις,

λάθρα δὲ τόλμας οὐ καλὰς κεκτημένας.
 αἱ πῶς ποτ', ὦ δέσποινα ποντία Κύπρι,
 βλέπουσιν ἐς πρόσωπα τῶν ξυνευνητῶν,
 οὐδὲ σκότον φρίσσουσι τὸν ξυνεργάτην
 τέρεμνά τ' οἴκων μὴ ποτε φθογγὴν ἀφῇ;
 ἡμᾶς γὰρ αὐτὸ τοῦτ' ἀποκτείνει, φίλαι,
 ὡς μήποτ' ἄνδρα τὸν ἐμὸν αἰσχύνασ' ἁλῶ,
 μὴ παῖδας οὓς ἔτικτον· ἀλλ' ἐλεύθεροι
 παρρησίᾳ θάλλοντες οἰκοῖεν πόλιν
 κλεινῶν Ἀθηνῶν, μητρὸς οὐνεκ' εὐκλεεῖς.

III.

Translate into Greek:—

Every one, except only cowards and bad citizens, must wish that the Athenians would be fools enough to come here and put themselves into our power. The tales which you have just heard are nothing better than fabrications, got up to alarm you; and I wonder at the folly of these alarmists in fancying that their machinations are not detected. You will be too wise to take measure of the future from their reports; you will rather judge from what able men such as the Athenians are likely to do. Be assured that they will never leave behind them the Peloponnesians in menacing attitude, to come hither and court a fresh war not less formidable; indeed I think they account themselves lucky that we with our powerful cities have never come across to attack them.

ITALIAN.

[Set only to the Art. Branch Candidates.]

Translate into English:—

I.

“Quando l' illustre cardinale Legato, rivestito di tutte le facoltà pontificali, si ridusse a Milano dopo la

battaglia di Ravenna, degnossi visitare il mio monastero, e quello commendare per discipline e opere di pietà. E volentieri egli volle darmi un attestato della estimazione grande che aveva concepita per me adoperando la mia persona, che io reputo indegna e peccatrice, per ricondurre sul retto sentiero alcuni monasteri che ei sapeva caduti per isventura in certe rilassatezze di regola non più tollerabili. Io mi schermii umilmente quanto per me potetesi, ma il prelato illustre non volle accettare le mie scuse, ed ordinommi che io mi stessi parata ad ogni suo cenno: promisi obbedire. Ora essendo volata al Signore la vostra reverenda madre, egli mi ha chiamata in fretta a questo monastero per esaminare se l'ordine e lo spirito di carità e divozione albergano, come credo, qua entro; se gli usi monacali sieno viziati o frantesi, e se il cenobio insomma abbia occorrenza di quelle riforme e rinnovazioni che io ho altrove posto in pratica, in virtù della papale potestà concessami. La mia dimora qui non sarà lunga, ma durerà fra voi all'avvenante dei restauri spirituali di cui scorgerò abbisognare questo sacro chiostro del Signore. Da questo brevissimo esordio, o care sorelle, potete per voi stesse comprendere quali saranno le mie disamine, quali le rassegne che io farò dei vostri sistemi, e quali le nuove regole che io reputerò lecito e dicevole apportarvi."

II.

La cortesia d'un amico mi ha fatto conoscere, uno di questi giorni, la Signora Anna Scuron, una tedesca che, dopo la morte del marito, è stata per molti anni quale istitutrice in casa Tolstoi.

Per dieci anni la signora potè osservare da presso il nobile conte, il pensatore di cui è dubbio se sia maggiore in Europa la fama dell'ingegno o delle bizzarie. Lo ha circondato d'un culto rispettoso: "l'ho veramente amato" essa dice candidamente; ma tutti questi delicati e rispettosi sentimenti non hanno impedito alla Signora Scuron, che è badese, di osservare l'uomo e l'ambiente con l'umorismo e il senso pratico de' tedeschi meridionali.

Così a sentirla raccontare gli aneddoti, gli episodi,

gl' incidenti della vita famigliare di Tolstoi c' è qualche volta da stupire e spesso da sorridere.

Si sa, per esempio, che il grande e celebre romanziere da qualche tempo ha giurato guerra alla carne È verissimo—dice la signora ; il conte vede nella nutrizione a base di carne non soltanto uno sperpero, ma anche una causa di decadenza morale. E la sua famiglia, che continua però a mangiare rosbiffe e bistecche, rispetta l' opinione del suo capo e volentieri ne provvede la tavola di surrogati vegetali, che sono in Russia più che altrove molto costosi.

III.

Translate into Italian :—

A telegram from Havana, published by the *Imparcial*, gives particulars of the engagement recently fought in Cuba, as briefly announced in the official telegram which reached here two days ago. Prior to the encounter the detachment of Colonial troops which was engaged in the operations in the district succeeded in capturing an insurgent spy who was carrying a number of letters sent by the chief Maceo to Marti and Gomez. The prisoner stated that 800 insurgent Cavalry were assembled at Dos Rios. The Spanish column, which was commanded by Colonel Sandoval, marched without delay towards this point, and came upon the enemy by surprise. The rebels stubbornly resisted, however, and fought for two hours before they showed any signs of wavering. When, at length they began to fall back, the chief Marti harangued them, revolver in hand, and exhorted them to hold firm. Marti himself, however, soon fell to the ground mortally wounded, having been struck by two bullets, one of which pierced his neck and the other his chest. Both were fired by a man named Oliva.

KNOWLEDGE OF ART OBJECTS.

[Set only to the Art Branch Candidates.]

[Only eight questions to be attempted.]

1. Mention two remarkable painters of Rome; of Venice; of Flanders; of Holland respectively. Who were the best English painters of last century?
2. Who were Albert Dürer, Peter Vischer, Veit Stoss, and Jamnitzer? Mention some one work of each.
3. What work has been produced by Bachelier of Toulouse, Boule, Riesener, Gouthière, Grinling Gibbons, Chippendale, and during what different periods?
4. What kind of jewellery has been found in Etruscan and Greek tombs? Were the ancients acquainted with the use of enamel on metal? How far back can we trace the art of imitating precious stones?
5. What work was produced by Luca della Robbia? What is his date? Trace the origin of Majolica, and name the most famous painter of this ware, and of the lusted majolica ware. Where did each of them work?
6. Describe the character and methods of decoration of Venetian glass? What is filigree glass? How is it made into vases and dishes? What is flint glass, and what kind of decoration is applied to it?
7. Where has hard porcelain been made in Europe? Give the names of factories of soft porcelain in France and England, and of pottery in England. Mention the name of a well known English pottery maker of the last century, and of a sculptor who modelled for him. Name an English factory of decorated stoneware of earlier date.

8. How do the Persians decorate their arms and other metal work? What decorative Ceramic work do they make? How far does their religion affect their designs in metal work, pottery, and painting?
9. How far are the ancient traditions of jewellery carried out in various parts of India? What kinds of jewellery are worn by Indian peasants? What lacquer work is produced in Cashmere?
10. Where are the finest Oriental carpets made? What animal supplies the wool of Cashmere shawls? What kind of gold embroidery is produced in Benares?
11. Who was Hans Holbein? When did he come to England? Mention some of his various works in and out of England.
12. What different descriptions of lace are there? Describe the specialities of Venetian, Brussels, Devonshire, and the towel lace of Genoa.

HISTORY OF ART.

[Set only to the Art Branch Candidates.]

[Only eight questions to be attempted.]

1. Give a short account of the sculptors Pheidias, Praxiteles, Scopas, and Ictinus. Refer to any of their several works still extant; also to works of Græco-Roman sculpture and to any artist of that school.
2. What is known of the work of the ancient Greek and Græco-Roman painters? How far do these works respectively illustrate the costume or the furniture of their several ages?
3. Of what metal were the statues, armour, weapons, and articles of daily use made in ancient Greece and Rome? Refer to the fullest public collection of such objects at home and abroad.

4. Are there any extant remains of the Mausoleum ?
By whom and when was it erected ? Who were the principal architect and sculptor ?
5. Describe shortly the sculptures of the Arch of Titus, of the Column of Trajan, and that of Antoninus, giving their several dates. Is the sculptor of either of these columns known ?
6. Where is the Pyramid of Cheops ? When was it erected ? What was the purpose of this and similar structures ?
7. What different kinds of chair were used by the ancient Egyptians ? Do any examples survive ? Can you refer to any existing example of an Egyptian chariot ?
8. Do the monuments of Egypt illustrate Egyptian writing ? What various kinds of writing were in use ? By what means were modern nations enabled to decipher them ?
9. Where are Kouyunjik and Khorsabad, and to whom are we indebted for the discoveries made there ? At what period were these discoveries made ?
10. What knowledge have we of the furniture of the ancient Assyrians ? What kind of sculpture did they make ? Refer to any extant examples.
11. Where is Byzantium, and what is its present name ? How came that city to give an impetus to the decorative arts ? Refer to extant examples of Byzantine art. What parts of Europe were influenced by artists from Byzantium ?
12. How far was sculpture applied to buildings and monuments during the 13th and 14th centuries, A.D. ? In what respects does it differ from classic sculpture ? Give instances in regard to buildings and sepulchral monuments.
13. How are the interior walls of St. Mark's, Venice, St. Sophia, Constantinople, St. Apollinare, Ravenna, decorated ? With what kind of marble or ceramic decoration were the floors of these churches and of our own mediæval churches respectively laid ?

14. What is meant by the term *Painted* glass windows ? What different styles of glass painting prevailed during the middle ages ? Refer to a well known example in England of the latest style.
15. What kind of armour is shown in the Bayeux Tapestry ? Describe the principal changes in defensive and tilting armour down to the time of the Tudor Kings. What was the surcoat, and why was it worn ?
16. To what ancient nations was the use of Tapestry known ? Was it much used during the middle ages ? What class of subjects were generally portrayed on the large Arras tapestries of the late 15th century ? Name an Italian, French, and English seat of tapestry manufacture.
17. Describe the celebrated ivory chairs of Rome and Ravenna. What were the more important (i) ecclesiastical objects made in ivory during the middle ages, and (ii) objects made thus for civil use ?
18. What was the nature of the construction and what the method of decoration of the great wooden roofs of churches and halls in mediæval England ? How do they differ from the great wooden roofs of halls still extant in Italy ?
19. What kind of carriages were in use in the middle ages ? What were litters ? How were they carried by horses ? Are such carts as are seen in the Bayeux Tapestry still to be met with ?
20. At what period was Westminster Hall built ? How far has it been altered since its first erection ? At what period was the present roof constructed ?

GERMAN.

[Set only to the Science Branch Candidates.]

Translate into English :—

I.

Der Wirt hat geladen, und Säle wie Zimmer sind bereits festlich zur Aufnahme der Gäste geschmückt und mit Teppichen und Wassen behängt; der Fußboden ist mit Teppichen bestreut. Da nahen die ersten Gäste; der Wirt mit seiner Gattin gehen ihnen bis vor die Burg entgegen und bewillkommen sie mit Gruß und Kuß; die geehrten Gäste wurden damals stets von den Frauen mit diesem früher freigebiger gespendeten Zeichen der Zuneigung geehrt. Es ist am Abend, und man begiebt sich zur Ruhe, denn morgen erst soll das Fest beginnen und mehrere Tage hindurch währen. — Am anderen Morgen wird gleich mit dem Grauen des Tages wie immer die heilige Messe besucht, entweder in der gemeinsamen Kirche oder in der Hauskapelle. Nach der Rückkehr aus dem Gottesdienste setzt man sich zum Morgenimbisse hin, auf welchen dann sogleich allerlei gesellschaftliche Unterhaltungen folgen: es wird getanz, und die Männer führen wohl auch ein kleines Turnier auf. Da plötzlich erschallt des Turmwarts Horn: die Zeit zur Hauptmalzeit ist da, und man begiebt sich zur Tafel. In der ältesten Zeit saßen die Geschlechter gesondert in verschiedenen Sälen, später in einem zusammen und meist dann paarweise geordnet. Die Zeit bei Tische schwindet bald dahin, denn sie wird durch muntere Unterhaltung verkürzt.

II.

Die Mitglieder des Kriegsrats gerieten in große Verlegenheit; sie antworteten, daß sie erst die Rechtskundigen darüber vernehmen müßten; der König gab ihnen über diese Erklärung seinen Beifall zu erkennen. Er habe, sagte er ihnen, die

Parlamentsakte sich vorlegen lassen; nur über die Verwendung der Gelder, über nichts weiter seien sie Rede zu stehen schuldig: er drohte ihnen sogar, wenn sie weiter gehen würden, mit seiner Ungnade. Der Vorsteher des Kriegsrats, G. Carew, machte ihn darauf aufmerksam, daß die Bewilligung der Subsidien, die er von dem Parlamente fordere, durch eine solche Antwort gehindert werden dürfte; es wäre besser, daß die Kriegsräthe, denn dahin würde es gekommen sein, in den Tower geschickt würden, als daß das gute Verhältniß zwischen König und Parlament Beeinträchtigung erfahre, die Zahlung der Subsidien verhindert werde. Carl I. sagte, auf das Geld komme es doch nicht allein an; das Geld sei eine Waare, die man zuweilen auch zu theuer kaufen könne. Er dankte ihnen für die Rücksicht, die sie auf ihn nahmen; aber nicht sie seien es, fügte er hinzu, auf welche es das Parlament abgesehen habe, sondern er selbst.

III.

Translate into German (making use of German handwriting):—

Such a city was of moderate size. No city in Greece proper exceeded in size such cities as Edinburgh or York, and most of them were of a smaller area than Lincoln and Oxford. Even Rome, Syracuse, and Alexandria, the largest cities of the ancient world, were not so vast but that one could walk round their outer walls in a summer afternoon. In Greece and Italy, every considerable city was beautiful and set in a beautiful site—with a central citadel crowned with porticoes, colonnades, and temples; and in some cities, as Athens, Corinth, Ephesus, &c., with a panorama of varied splendour. Within the walls there would be ample space for gardens, groves, parks, and exercise grounds; and on issuing from the walls without, the open country at once presented itself, where game could be chased or the mountain-side could be roamed. There were no leagues of dull and grimy suburbs. . . . Health was a matter of religion, and it was vastly promoted by this, that cleanliness and sanitary discipline was a religious duty as well as an affair of personal pride.

ELEMENTARY MATHEMATICS. (1.)

[Set only to the Science Branch Candidates.]

1. Find the Least Common Multiple of 18, 45, 63, 66.

What is the least sum of English money which could be distributed equally between 18, 45, 63, or 66 persons?

2. Simplify

$$\frac{3 + \frac{2}{3}}{4 + \frac{1}{2}} \text{ of } \frac{4 - \frac{1}{2}}{3 - \frac{2}{3}} \div \left\{ 1 - \frac{4}{9} \left(\frac{8 - 8}{9 - 9} - \frac{7}{9} \right) \right\}.$$

3. Find the commission on £319. 10s. 7d. at $2\frac{3}{8}$ per cent.

4. Divide £1. 14s. 10d. between three boys aged $7\frac{1}{2}$, 12, and $13\frac{1}{2}$ respectively, so that the share of each may be proportioned to his age.

5. Find the first four figures of the decimal fraction which expresses the ratio of 2 tons 13 cwt. 3 qrs. 19 lbs. 11 oz. to 12 tons 1 cwt.

6. Calculate the true discount on £466. 5s. 9d. fully due in 146 days, simple interest being reckoned at the rate of $5\frac{1}{2}$ per cent. per annum.

7. A man has a certain gross income of which the whole is liable to income tax at the rate of $7\frac{1}{2}$ d. in the £. If his gross income and the rate of income tax were each 10 per cent. higher than they are, his net income would be £44. 17s. more than it is. What is his actual gross income?

8. Find the value of $10x - 2\{10 - x(9\frac{1}{2} - x) + x(10 - x)\}$ when $x = 3$.

For what value of x is the value of the expression ten times as great as when $x = 3$?

9. Find the product of $2x^2 - 3xy + y^2$ and $x^2 - xy - 2y^2$.

Find also the difference of the squares of $\frac{2x - y}{\sqrt{3}}$

and $\frac{x - 2y}{\sqrt{3}}$. Divide the product by the difference.

10. Reduce to its simplest form

$$\frac{14}{5(x-5)} - \frac{1}{3(x-3)} - \frac{2x^2 - 3x - 7}{x(x^2 - 8x + 15)}.$$

11. Solve the equations

$$(i.) \frac{x-5}{x-6} = \frac{x+49}{x+51};$$

$$(ii.) 5x - 3y = 11 = \frac{11}{13}(17x + 2y).$$

12. Find the square root of

$$\frac{4x^4}{9} - 2x^3y - \frac{5x^2y^2}{12} + 6xy^3 + 4y^4.$$

13. Show that the product of any three consecutive whole numbers, ascending from, and including, a given number, exceeds, by six times the square of that number, the product of the three consecutive numbers descending from, and including, the same number.

Can you infer from your proof whether this is true when the original number is a fraction, the consecutive numbers being obtained as before by the addition and subtraction of 1 and 2?

ELEMENTARY MATHEMATICS. (2.)

[Set only to the Science Branch Candidates.]

1. What conditions must hold between the coefficients of the equations $ax^2 + bx + c = 0$, $Ax^2 + Bx + C = 0$, if the roots of the latter exceed by unity the roots of the former?

Form the equation whose roots are $\frac{8 \pm \sqrt{65}}{3}$.

2. Sum the series $a + (a+1) + (a+2) + \dots + (a+l)$.

Find the first term and the common difference of an arithmetical progression of which the sum of m terms is n and the sum of n terms is m .

3. Solve the equations

$$(i.) \frac{x}{2} + \frac{2y}{5} = 3,$$

$$2x^2 + \frac{5y^2}{2} = 70\frac{1}{2}.$$

$$(ii.) 4x^2 - 6x + 3\sqrt{2x^2 - 3x + 10} = 7.$$

4. On what principle are negative and fractional indices interpreted? What meanings must on this principle be attributed to x^0 , $x^{-\frac{2}{3}}$?

Multiply

$$\frac{2}{3}x^{\frac{2}{3}} - x^{\frac{1}{3}}y^{\frac{1}{3}} + \frac{3}{2}y^{\frac{2}{3}} \text{ by } \frac{3}{2}x^{-\frac{2}{3}} + x^{-\frac{1}{3}}y^{-\frac{1}{3}} + \frac{2}{3}y^{-\frac{2}{3}}.$$

5. In how many different ways would it be possible to arrange the sitting in a railway carriage (with four seats on each side) of eight persons, of whom two will not sit with their backs to the engine and one insists on doing so?

6. Expand by the Binomial Theorem $(x + a)^5$.

Obtain the first four terms in the expansion by the Binomial Theorem of $\sqrt[3]{\frac{3}{(3 - 4x)^4}}$.

7. Expand by the Binomial Theorem $(1 - x)^{-2}$ as far as the fourth power of x .

Determine the coefficient of x^r in the product of $1 - 2x + 3x^2 - 4x^3 + \dots$ and $1 + 2x + 3x^2 + 4x^3 \dots$

8. Describe a square on a given straight line.

Four points P, Q, R, S are taken in the sides AB, BC, CD, DA of a square ABCD such that AP, BQ, CR, DS are all equal. Show that PQRS is a square.

9. Prove that the difference of the squares on two unequal straight lines is equal to the rectangle contained by their sum and difference.

10. If D is the mid-point of BC, a side of the triangle ABC, show that the sum of the squares on BA, AC is double of the sum of the squares on BD, DA.

11. Two circles cannot touch each other either internally or externally at more than one point.

Two circles touch internally at A, and a chord AQR is drawn cutting the inner circle at Q and the outer circle at R. Show that the length of QR cannot exceed the difference of their diameters.

12. In Euclid III. 20, it is proved that the angle at the centre of a circle standing on any arc is double of any angle at the circumference standing on the same arc; and the proof given by Euclid holds good when the angle at the centre exceeds two right angles.

Assuming the truth of this theorem and its extension show that the opposite angles of a quadrilateral inscribed in a circle are supplementary.

13. Describe a circle touching one side of a triangle and the other two sides produced.

If P, Q, R be the centres of the three circles which can be so described, and O the centre of the circle inscribed in the same triangle, show that the perpendiculars from P, Q, R on QR, RP, PQ intersect in O.

GEOMETRICAL DRAWING.

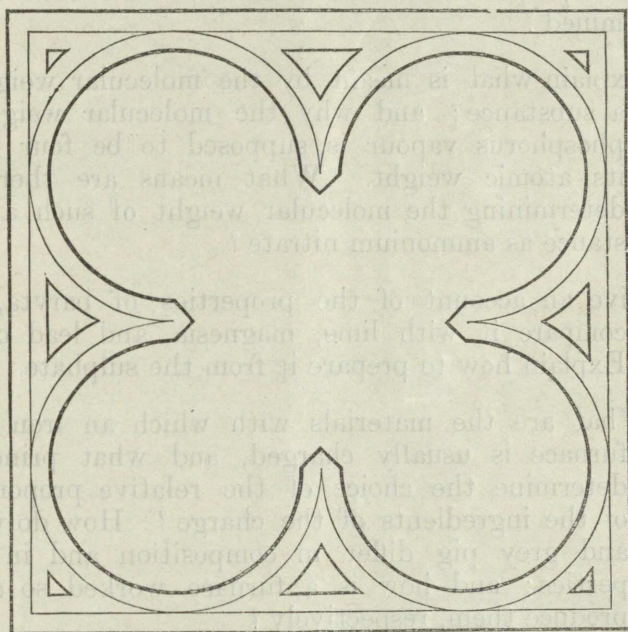
[Set only to the Science Branch Candidates.]

N.B.—Each figure should be neatly drawn in clear, fine pencil lines, on the same page as the question: the figures should be inked in if time permits. Questions 1 and 5 MUST be inked in, or no marks will be given.

The solutions must be strictly geometrical and all lines of construction should be shown dotted, and unnecessary lines rubbed out.

1. Draw a scale having a representative fraction of $\frac{1}{8}$, divided to read feet and inches: show 4 feet.
[This MUST be inked in or no marks will be given.]

2. Construct a triangle the sides of which are 3 inches, 4 inches, and 5 inches; and describe a circle about it.
3. Find a mean proportional between two lines 2.25 inches and 1.75 inches long: and construct a square equal in area to the rectangle contained by the two given lines. [*Show all the construction lines.*]
4. Describe three circles (radii, $1\frac{1}{2}$ inches, 1 inch, and $\frac{1}{2}$ inch) touching each other externally.
5. Copy the figure given below. [*This must be inked in, or no marks will be given.*]



6. Draw an isosceles triangle the angle at the vertex being 103 degrees, and the sum of the base and one side being 4.17 inches; and describe an equilateral triangle equal to it in area.
7. A dogcart is being driven in a straight line along a level road, the diameter of the tire of the wheels is 49 inches: draw the curve described by a point on the tire of one of the wheels during a complete revolution. Scale, $\frac{1}{35}$. (Take $\pi = \frac{22}{7}$.)

CHEMISTRY.

[Set only to the Science Branch Candidates.]

A. INORGANIC.

1. Describe the chemical nature of the atmosphere, and explain how to make a eudiometric analysis of the proportion of oxygen in atmospheric air. How has the proportion of ammonia in the air been determined?
2. Explain what is meant by the molecular weight of a substance; and why the molecular weight of phosphorus vapour is supposed to be four times its atomic weight. What means are there for determining the molecular weight of such a substance as ammonium nitrate?
3. Give an account of the properties of baryta, and compare it with lime, magnesia, and lead oxide. Explain how to prepare it from the sulphate.
4. What are the materials with which an iron blast furnace is usually charged, and what principles determine the choice of the relative proportions of the ingredients of the charge? How do white and grey pig differ in composition and in properties; and how is a furnace worked so as to produce them, respectively?
5. In what substances and in what states of chemical combination is chromium chiefly met with in nature? Describe, and explain, the preparation of potassium bichromate, and of chloro-chromic oxide. Give examples of compounds of similar constitution derived from elements other than chromium.
6. The analysis of a mineral gave Al_2O_3 54·86, Fe_2O_3 2·50, FeO 2·14, ZnO 38·05, MgO 1·45: determine its formula, taking

$$\text{Al} : \text{Fe} : \text{Zn} : \text{Mg} = 27 : 56 : 65 : 24.$$

B. ORGANIC.

7. Explain how you would proceed in order to prove the presence, and to determine the proportion, of (1) nitrogen, (2) sulphur, in white of egg.
8. Give an account of the preparation of acetic acid from green wood, and explain the chemistry of it. Explain also how acetic anhydride is obtained. What constitutional formula is assigned to acetic acid, and on what grounds?
9. Describe the preparation of aniline from benzene, and explain the chemistry of the several steps of the process. Give some account of the properties of aniline. What is the action of nitrous acid on a solution of aniline hydrochlorate?
10. Give the general formula for a ketone. How is acetone prepared? Compare acetone with (acetic) aldehyde in constitution and properties. What is the action of phosphoric chloride on acetone?

PRACTICAL CHEMISTRY.

[Set only to the Science Branch Candidates.]

Time allowed, 4 hours.

1. Estimate, by means of potassium iodide and standard solution of thiosulphate, the proportion of hydrogen peroxide in the solution supplied.
2. Prepare a crystallized specimen of pure silver nitrate from the standard silver wire supplied.
3. Identify each of the substances labelled A, B, C; and state every experiment and observation you have made upon them in the order in which they were made, and state the effects you have noticed, if any, to occur. Finally sum up the reasons for your conclusions as to what the substances are.

PHYSICS.

[Set only to the Science Branch Candidates.]

1. In what respects does a *sensitive* balance differ from an ordinary pair of scales? How could you make a correct weighing with a balance having unequal arms?
2. Describe an experiment to prove that a body weighs less in a liquid than in air by the weight of the liquid it displaces.
How would you find the volume of a given piece of glass?
3. A cylindrical diving bell, 8 feet long, is lowered mouth downwards into water. To what depth must the top of it be immersed that the water may half fill the cylinder? [The height of the water barometer is 34 feet.]
4. Explain how a pendulum compensated for temperature may be constructed of the metals zinc and iron, the coefficients of linear expansion of which are as 5 : 2.
5. Explain the statement that the mechanical equivalent of heat is 1400 foot-pounds centigrade.
A hundredweight of iron is supported at a height of 50 feet from the ground. Express its potential energy in heat units.
6. Describe and explain the principle of the kaleidoscope.
7. A star is looked at through a glass prism held in the hand with its edge at right angles to the line joining the eye and star. Describe and explain the appearance observed.
8. Given a suitable instrument, explain how you would proceed to measure the magnetic dip at any place.
9. Describe an instrument designed to measure the difference of electrical potential between two points, and the method of using it.

10. A battery of six Daniell cells (E.M.F. = 1 volt, and internal resistance = .5 ohm, for each cell) is joined up in series with a galvanometer of 20 ohms, and a coil of wire of 10 ohms resistance. What current is flowing through the galvanometer, and what is the difference of potential between the ends of the coil?
11. Describe the apparatus necessary for electrolysing acidulated water, and explain how to determine the electrochemical equivalent of hydrogen.

PHYSICS.

(Practical Work.)

[Set only to the Science Branch Candidates.]

Time allowed, 3 hours.

1. Determine the specific gravity of the given liquid, (a) by weighing a solid in it, (b) by the specific gravity bottle.
2. Determine the latent heat of water.
3. Determine the focal length of the given lens.
4. Determine the velocity of sound in air by a resonance experiment, using a tuning fork of known vibration-frequency.
5. Determine the ratio of M (the magnetic moment of the given magnet) to H (the horizontal component of the Earth's magnetic intensity).
6. Measure the resistance of the given wire of Wheatstone's Bridge.
7. Compare the electromotive forces of the given cells.

GEOLOGY.

[Set only to the Science Branch Candidates.]

1. Of what rocks are the following minerals especially characteristic :—hornblende, labradorite, nepheline, garnet, and muscovite ?
How would you recognise these minerals ?
2. Give an account of the mineralogical composition, structure, and mode of occurrence of granite. Describe the phenomena observed at the contact of granite with other rocks, illustrating your answer as far as possible by referring to actual cases.
3. Describe the composition, structure, and mode of formation of sandstone deposits.
4. Give an account of algæ, foraminifera, and sponges as rock producers.
5. Prove by reference to geological structure that large masses of material have been removed from certain districts. How has the removal been effected ?
6. Draw up a table representing the sequence of the Lower Palæozoic strata. How would you recognise the presence of the different sub-divisions in any particular district ?
7. Describe the changes in physical geography which marked the commencement and close of the Jurassic period in Britain.
8. Give an account of the Tertiary strata of the London Basin.
9. Give an account of the following deposits and state what you know as to the conditions under which they were formed :—Tinstone of Cornwall, Rocksalt of Cheshire, Ironstone of Cleveland, and Marble of Derbyshire.
10. Compare the Palæozoic with the Mesozoic Cephalopoda, and state the range in time of each of the following genera :—Orthoceras, Goniatites, Scaphites, and Ancyloceras.

11. Enumerate the principal plant-bearing deposits known in the British Isles, and sketch in brief outline the changes in the flora which a study of these deposits has brought to light.
12. By what agencies is the form of a coast determined? Compare the eastern with the western coast of Great Britain and explain the differences observed.

PRACTICAL GEOLOGY.

[Set only to the Science Branch Candidates.]

Time allowed, 2 hours.

1. Name the minerals marked 1 to 8.
2. Name the rocks marked 9 to 16.
3. Draw a section along the line AB of the geological map.
4. Describe the sections marked 17 and 18.
5. Test the dark mineral in specimen 19 with the blow-pipe.
What conclusions do you draw from the result?
6. Name the fossils 20 to 36, and refer each to its position in the geological scale.

HIGHER MATHEMATICS. (1.)

[Set only to the Science Branch Candidates.]

[Full marks may be obtained for about two-thirds of this paper.]

1. Any point E is taken in the side DC of a parallelogram ABCD; BE is joined and produced to any point F. Show that the triangles AEF and CDF are of equal area.

2. On a given straight line BC but upon opposite sides of it are described a square and a triangle BAC right angled at A. Prove that the line bisecting the angle A will divide the square into two equal parts.

3. If $a + b = c + d$, show that

$$(i) \frac{ac(b+d) - bd(a+c)}{(a+c) - (b+d)} = \frac{1}{2}\{ad + bc\}.$$

$$(ii) \frac{ac - bd}{(a+c) - (b+d)} = \frac{1}{2}(a+b) = \frac{1}{2}(c+d).$$

4. Prove, by means of the identity

$$\{(2+x)x+1\}^n = (x+1)^{2n}, \text{ that}$$

$$2^n + n(n-1)2^{n-2}$$

$$+ \frac{n(n-1)(n-2)(n-3)}{\{2\}^2} \cdot 2^{n-4} + \&c. = \frac{\{2n\}}{\{n\}^2}.$$

5. A circular disc is turned in a lathe until its diameter is reduced 1 per cent. The operation is repeated, the new diameter being reduced 1 per cent. How many times may this be done before the area of the disc is less than $\frac{3}{4}$ of what it was at first?

6. Find the value of θ (less than 180°) which satisfies the equation

$$\cos \theta = \frac{\cos 100^\circ 15' 30''}{\tan 47^\circ 20' 45''}.$$

7. In any triangle, show that

$$b \cos B + c \cos C = a \cos (B - C)$$

$$\text{and } b \sin B - c \sin C = a \sin (B - C).$$

8. If the sides BC, CA, AB of a triangle ABC be 20, 15, and 7 feet respectively, show that $A - B = 90^\circ$.

9. Three tangents to a parabola intersect in the points A, B, C. If BC touch the curve at its vertex, find, geometrically, the points of contact of the tangents AB, AC.

10. An inextensible band of length L passes round three pulleys A, B, C, each of radius r , in such a manner that the portion between any two pulleys is parallel to the line joining their centres. Show that if A, B be fixed with their centres at a distance a apart the locus of the centre of the third pulley C will be an ellipse, and find the lengths of its axes.

11. The coordinates of P, Q, R are (2, 3), (-1, 4) and (-2, -4) respectively.

Find (i) the equation of the straight line through P parallel to QR, and (ii) the equation of the circle circumscribing the triangle PQR.

12. Find the coordinates of the points where the straight line

$$3y = 2x + 4$$

meets the parabola $y^2 = 4x$, and write down the equations of the tangents and normals to the curve at those points.

13. Find the equations of the ellipse and hyperbola which pass through the point (5, 4) and have for their foci the points (± 3 , 0).

HIGHER MATHEMATICS. (2.)

[Set only to the Science Branch Candidates.]

[Full marks may be obtained for about two-thirds of this paper. Great importance is attached to accuracy. N.B. g may be taken = 32.]

1. Explain how you would determine, by the Polygon of Forces, the magnitude and direction of the resultant of a system of coplanar forces acting at a point.

Forces of 9, 25, and 30 lbs. wt. act in one plane on a particle, the angle between each two being 120° . Find the magnitude of their resultant.

2. Define the centre of a system of parallel forces, and write down its coordinates in the case of a system of forces $P_1, P_2, \&c.$, acting at points whose coordinates are $(x_1, y_1), (x_2, y_2), \&c.$, respectively.

Three like parallel forces of 6, 7, and 8 lbs. wt. act at the angular points A, B, C, of a triangle ABC in which $BC = 3$, $CA = 4$, and $AB = 5$ feet. Find the distance of the centre of the system from C.

3. A uniform rod AB whose length is 4 feet and weight 3 lbs., can turn in a vertical plane about a hinge at A. It is supported in a horizontal position by a string BC, 7 feet long, whose extremity C is attached to a fixed point 6 feet above the rod. Find the tension of the string and the pressure on the hinge.

4. Show that, if a body be placed on a horizontal plane, it will stand or fall according as the vertical through its centre of gravity falls within or without its base.

Explain clearly what is meant by its "base."

A hoop of radius r is placed upon a circular table of radius R ; find the greatest distance between the centres of the hoop and table consistent with equilibrium.

5. Describe the Danish steelyard, and show how to graduate it.

A straight line is drawn to represent a Danish steelyard, A being its centre of gravity, and B the end from which the weight is suspended. On AB as diameter a circle is described, and CD is the diameter at right angles to AB. If CD be produced to N making $CDN = \frac{1}{2}(n+1)CD$, and if BN cut the circle in P, then CP will intersect AB at the graduation corresponding to a weight n times that of the bar.

6. A particle of mass m is moving in a given direction with velocity u . How must it be struck in order that it may move with velocity v in a direction at right angles to its original line of motion?

7. A particle is projected with a velocity u subject to a uniform acceleration α , find an expression for the space described in the n^{th} second.

At a certain moment it was observed that the last x feet were described in t_1 seconds; show that, if t_2 seconds be the time of describing the next x feet, then

$$x = \frac{1}{2}\alpha t_1 t_2 \cdot \frac{t_1 + t_2}{t_1 - t_2}.$$

8. An imperfectly elastic ball impinges in a given direction and with given velocity against a smooth plane; determine the magnitude and direction of its velocity after impact.

If the ball strike alternately two planes inclined at an angle θ , and if the directions of motion before the first, and after the second, impact be the same, show that the angles of incidence (α) must be the same for both planes, and that

$$\tan(\theta + \alpha) = \frac{1}{e} \tan \alpha.$$

9. A stone is thrown from the top of a cliff 550 feet high with a velocity of 210 feet per second, in an upward direction making an angle of 30° with the horizontal. Find the time it takes to reach the ground at the foot of the cliff, and the distance of the point where it strikes from the point of projection.

10. A particle moves on a smooth curve in a vertical plane under the action of gravity. State the connexion between the velocity at any point and the position of the particle on the curve.

A heavy particle hangs from a fixed point by a string, and makes oscillations in a vertical plane through the point of suspension. Find the maximum angle of swing if the tension of the string is never to be greater than twice the weight of the particle.

APPLIED MECHANICS.

[Set only to the Science Branch Candidates.]

STRUCTURES.

1. A cord, which may be supposed to be without weight, is suspended between two points not at the same level. At various points along it, known weights are hung. What method would you adopt to ascertain the exact form assumed by the cord?
2. A girder, 60 feet in length, is loaded at a point 15 feet from one end with a weight of 40 tons. Find the bending moment at this point, and the shearing force in the middle. Also sketch the diagram for bending moment and shearing force.
3. In question 2, suppose the girder to be 5 feet deep, find the safe area for the top and bottom flanges assuming it to be made of wrought iron, with a safe tensile and compressive strength of 5 tons per square inch.
4. A rod of circular cross section and 3 inches diameter acts as one of the rods in a suspension bridge. Find the amount which it would stretch under a load of 30 tons, also find what difference it would make in the amount of elongation according as the load is applied suddenly or gradually.

Modulus of elasticity of material = 30,000,000 lbs. per square inch.

Length of rod = 50 feet.

5. Sketch and explain an apparatus by means of which a round specimen of material, such as the above, may be held in a machine for testing its tensile strength, and also any form of apparatus for testing the amount by which it elongates under a given load.
6. Prove that the longitudinal strength of a thin cylindrical shell is twice as great as its transverse strength. State briefly what difference is made by assuming the shell to be thick instead of thin.

7. State briefly what you know about the deflection of girders and show how to calculate the maximum deflection of a beam of uniform strength and depth.

MACHINES.

8. Show how to find the relative velocities of the piston of an engine and the crank pin at any given point of the stroke.
9. Show by means of outline sketches the various mechanisms by which a straight line motion may be obtained.
10. State briefly what you know about the design of the teeth of wheels.
11. How would you find the proper form of a tooth for a given-sized spur-wheel to work correctly with the teeth of another spur-wheel, of different size, which is given you?
12. What are meant by "height" and "stability" as applied to steam engine governors?

Find the "height" of an ordinary governor when working at 100 revolutions per minute. If the governor balls each weigh 5 lbs. and a weight of 60 lbs. is placed on the slider, find the height. The links suspending the slider may be taken as each equal in length to the two arms carrying the governor balls.

13. Describe the "cycle" of an Otto gas engine, and state what are the chief causes of loss of power in such an engine.
14. How would you calculate the quantity of water discharged from a pipe of given diameter and of considerable length, the gradient being given?
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MACHINE DRAWING.

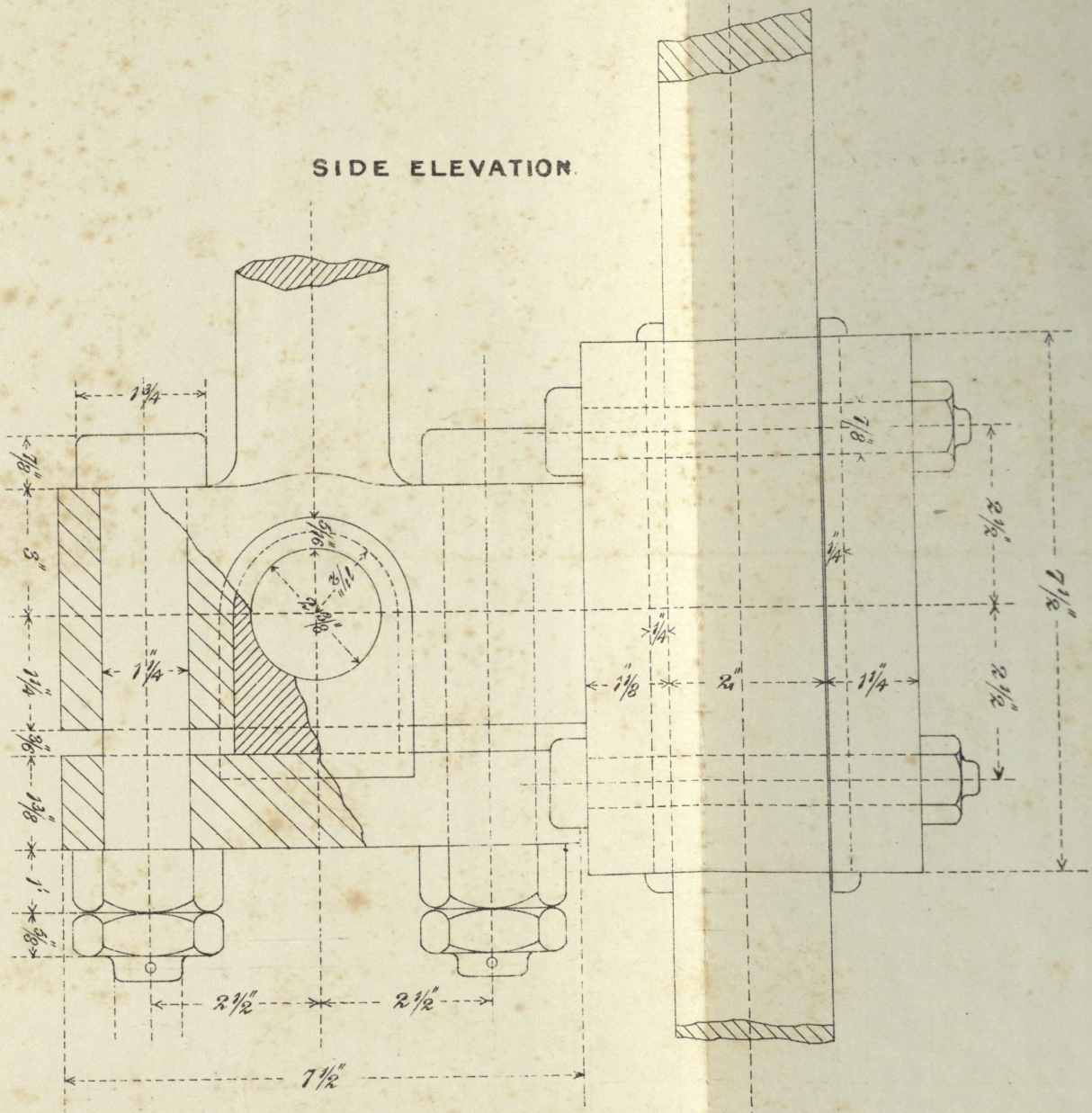
[Set only to the Science Branch Candidates.]

Draw to scale full size the cross-head for a marine engine, as shown on the accompanying diagram, and, if time permits, ink in and colour the drawing. Draw also a front elevation of the cross-head.

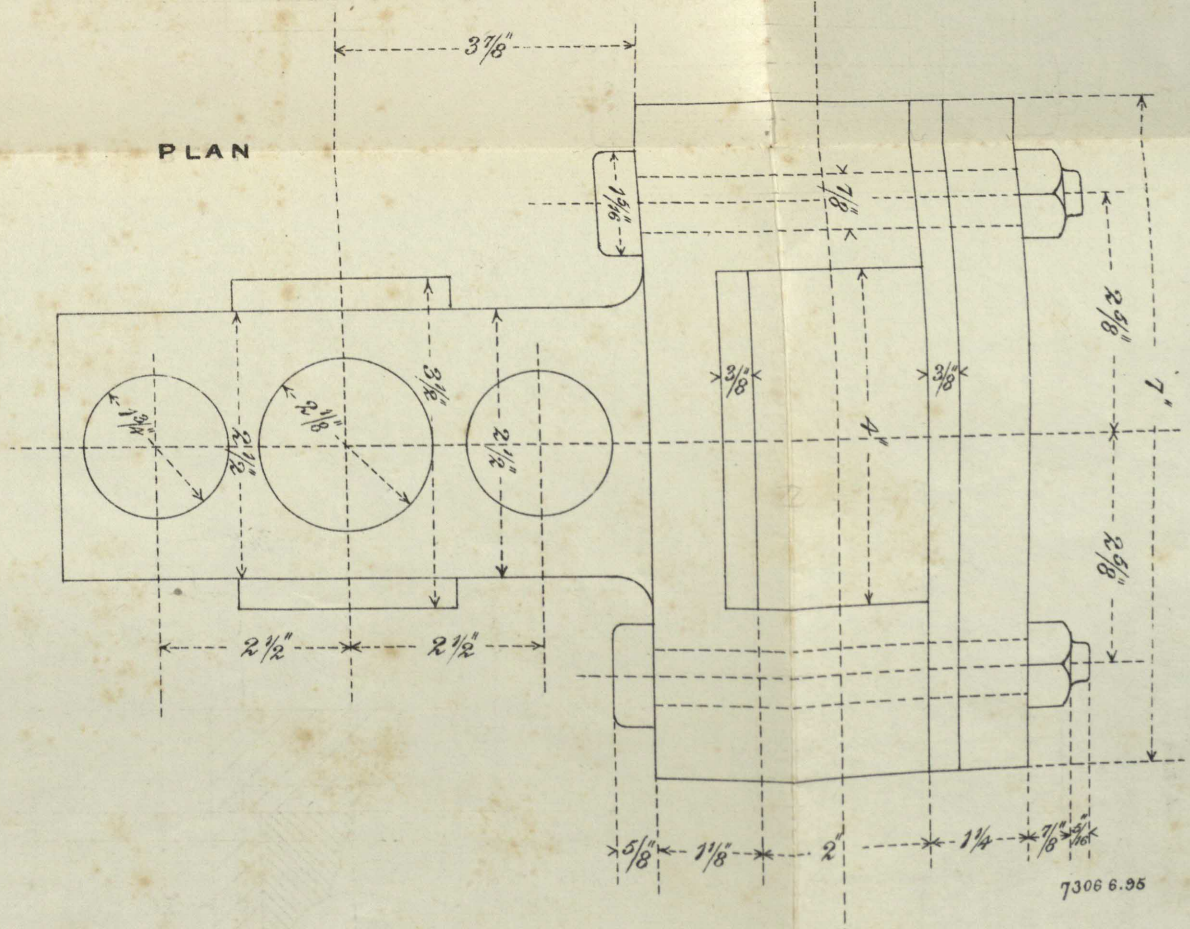
SOUTH KENSINGTON MUSEUM, JUNIOR ASSISTANTS.

CROSS HEAD FOR MARINE ENGINE.

SIDE ELEVATION.



PLAN



I.—TABLE showing the RESULTS of an OPEN COMPETITIVE EXAMINATION, held on the 9TH of JULY, and following days, in the year 1895, of CANDIDATES for 2 Situations as JUNIOR ASSISTANT IN THE SOUTH KENSINGTON MUSEUM, ART BRANCH.

Number		Name.	Obligatory.										Optional.	Total.
In Order of Merit.	In Examination.		English Composition.	Drawing of Objects of Decorative Art.	Any three of these languages may be taken, but two are Obligatory.					English History.	Knowledge of Art Objects, and History of Art. some one Period of			
		Maximum ..	500	500	500	500	400	400	400	400	1000			
I.—SUCCESSFUL CANDIDATES.														
1	5	Mitchell, H. P. ..	3 235	1 500	1 315	2 ..	2 306	..	1 291	1 791	2438			
2	2	Campbell, A. J. D. ..	1 380	2 380	2 170	3 ..	2 281	..	2 288	2 726	2225			
II.—UNSUCCESSFUL CANDIDATE.														
3	6		2 255	3 360	3 120	..	1 357	..	1 170	3 259	3 691	2212		

ALL CANDIDATES WHO FAILED TO QUALIFY IN ONE OR MORE OF THE PRESCRIBED SUBJECTS.

[illegible]

NOTE.—The ciphers enclosed in brackets thus [0] indicate the obligatory subjects in which the Candidates failed to qualify.

CIVIL SERVICE COMMISSION.

30th July, 1895.

II.—TABLE showing the RESULTS of an OPEN COMPETITIVE EXAMINATION, held on the 9TH of JULY, and following days, in the year 1895, of CANDIDATES for 2 Situations as JUNIOR ASSISTANT IN THE SOUTH KENSINGTON MUSEUM, SCIENCE BRANCH.

Number	In Order of Merit.	In Examination.	Name.	Obligatory.										Optional (any two).				Total.
				Geometrical Drawing.	English Composition.	Mathematics.	Any three of these subjects may be taken, but one is Obligatory.	Biolog.	Chemistry.	Physics.	Geology.	Higher Math.	Applied Mechanics and Drawing.	Latin.	Greek.	French.	German.	
			Maximum ..	500	500	750		500	500	500	500	500	500	250	250	250	250	3750
I.—SUCCESSFUL CANDIDATES.																		
1	7	Ackroyd, F. . .	..	402	300	519	..	..	..	339	375	..	305	..	..	66	..	2306
2	9	Dickinson, H. W. . .	..	402	290	503	..	..	194	273	..	..	317	..	..	179	109	2267
II.—CANDIDATES WHO FAILED TO QUALIFY IN ONE OR MORE OF THE PRESCRIBED SUBJECTS.																		
..	10	..	..	332	[0]	614	..	..	12	..	..	357	335	0	..	63	..	..
..	13	..	..	221	[0]	500	..	..	198	337	205	..	..	..	..	146	91	..

NOTE.—The ciphers enclosed in brackets thus [0] indicate the obligatory subjects in which the Candidates failed to qualify.

CIVIL SERVICE COMMISSION,
30th July, 1895.

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